ENVIRONMENTAL RESTORATION MANAGEMENT UPDATE

90th Space Wing ■ F. E. Warren AFB, WY 82005 ■ Volume 2, Issue 4 ■ Autumn 1999

Installation of Spill Site 7 Iron-Filings Wall Complete

In early August, the F. E. Warren Air Force Base (F. E. Warren) Installation Restoration Program's (IRP) contractor completed construction of an iron-filings treatment wall to clean up Trichloroethylene (TCE) groundwater contamination at Spill Site 7 (SS7). The site is now being returned to its original grade and seeded with native grasses.

To ensure the effectiveness of the treatment wall, 20 new monitoring wells were installed up-gradient of the wall, within the wall, and down-gradient of the wall. These wells will be used to monitor the reduction of contamination in the groundwater as it passes through the wall. Quarterly groundwater monitoring will begin in approximately six months — leaving enough time for the contaminated groundwater to flow through the treatment wall and reach the down-gradient monitoring wells.

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The iron-filings wall at Spill Site 7, pictured above undergoing installation, will clean up Trichloroethylene (TCE) contaminated groundwater beneath the site — preventing TCE from seeping into adjacent Diamond Creek. As groundwater flows through the wall, the TCE will react with the iron to form nontoxic by-products.

Inside This Issue . . .

Construction of Landfill 6 Cover Complete

During the summer of 1999, the IRP's contractor completed the installation of a Geosynthetic Clay Liner (GCL) at Landfill 6 (LF6), designed to prevent water from seeping through buried waste and carrying pollutants further into the groundwater. Following construction of the GCL, the contractor spread topsoil and applied a vegetative cover to prevent erosion. On steep slopes, the contractor placed protective matting over the cover to minimize erosion. The contractor also fenced the entire landfill and placed warning signs around the perimeter.

History

LF6 is located on approximately 51 acres near the western boundary of the base between Missile Drive and Diamond Creek. Domestic refuse and shop wastes were deposited in the landfill from 1971 through September 1984. Shop wastes reportedly disposed at LF6 included waste oil, solvents, hydraulic fluid, ethylene glycol, silicone, jet fuel, batteries and battery acid, pesticides, paints, and asbestos. Ash from the base coal-fired steam plant was disposed at this site until December 1989.

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Construction of Landfill 6 Cover Complete

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According to various reports, LF6 ranges between 15 and 60 feet in depth.

Why Use a Landfill Cover?

The selected Interim Remedial Action of covering LF6 is based on the types of wastes historically deposited at the site and the size of the landfill.

Treating hazardous wastes found in municipal landfills is usually considered impractical because of the size of the landfills and the variety of deposited materials. For municipal landfills, the U.S. Environmental Protection Agency (EPA) has determined that a cap provides suitable protection of human health and the environment.

The Air Force Plan

The Air Force, EPA, and Wyoming Department of Environmental Quality (WDEQ) chose a landfill cover that would meet the following requirements:

- Eliminate direct contact of human and ecological receptors with the landfill contents,
- Minimize the amount of moisture seeping through the cover,
- Provide surface water drainage from the surface of the landfill, and
- Minimize loss of cover material due to erosion.

The cover consists of the GCL and a soil cover, and includes a passive gas venting system to allow natural methane gas to escape. The soil cover consists of the following three layers: a layer of soil screened for large rocks to prevent damage to the GCL, a second layer of soil, and finally six inches of top soil suitable for growing a vegetative cover.

Air Force contractors completed construction of the Landfill 6 cover during the summer of 1999. The cover is designed to prevent water from seeping through the waste and carrying pollutants into the groundwater.

Construction Completed Ahead of Schedule

Overall, the project to cover LF6 has been a success even though a few problems were encountered along the way. After preparing the landfill surface this spring and beginning the GCL installation, mud resulting from late snowfall and rains partially halted construction. Erosion damage also caused further delay. Fortunately, the GCL was not damaged.

Although relatively slow in the beginning, construction was completed ahead of schedule due to the application of innovative ideas and new equipment. The contractors used a golf course turf raker to remove rocks from the soil before the GCL was applied, significantly speeding up the process. A new roller system used to lay the GCL also resulted in time savings.

Considering the complexity of this landfill cover and the size of this project, we are very satisfied with the results. Teamwork between Air Force Project Managers, contractors, the service center, Air Force Center for Environmental Excellence, Air Force Space Command, and the regulatory partners made it all possible. Thank you everyone for a job well done!

LF6 Construction Benefits Local Economy

Construction activities at Landfill 6 contributed approximately $2.3 million to the local economy in different service and contractor areas. The GCL was purchased from a Wyoming company at a cost of $640,000.

Community Corner

Observations from an F. E. Warren Neighbor

By Rolf Skoetsch, RAB Member

Are the environmental clean-up efforts at F. E. Warren, just feel good programs that satisfy a Federal requirement?

One day I received a postcard inviting me to a Restoration Advisory Board (RAB) meeting for the purpose of getting acquainted with F. E. Warren's environmental clean-up projects. The monthly RAB meetings provide an update on construction work in progress, and information about projects in various preliminary stages of investigation and/or design.

Being a neighbor immediately west of two landfill restoration projects in progress, I was curious to find out more about the projects, and determine for myself whether the work was really necessary. I attended one of the meetings and was immediately made to feel welcome. Everyone's questions were answered and detailed explanations about the base clean-up projects were offered. I observed the meetings to be a perfect forum for anyone to get an idea of the magnitude of the IRP's projects.

I immediately discovered that I was going to have to attend several of these meetings just to get the acronyms, abbreviations, and technical jargon relating to the cleanup efforts straight in my head. On top of the environmental language, the speakers also used a certain amount of military language, which also made my first couple of meetings a little difficult to follow. However, after attending the RAB meetings over the past six months, I am confident I now understand at least one third of what is being said without resorting to my dictionary!

The RAB meetings are attended by four distinct groups of people: the regulators — representatives from state and Federal agencies dealing with environmental matters; contractors and consultants — the people who are performing the initial investigations and/or engaged in the physical restoration work; military representatives from F. E. Warren AFB, its higher headquarters, and other military installations; and community members both on the RAB and just visiting.

It did not take me long to figure out that there is a tremendous amount of expertise sitting in the RAB meetings, as well as doing the actual work. There is also an extraordinary amount of cooperation between all entities involved, which was a pleasant discovery. Yes, there are steps and procedures that have to be followed, as in any private business or governmental bureaucracy. Yes, there are those fiscal accountability requirements, as should be whenever public funds are involved.

Rolf Skoetsch shares his thoughts about F. E. Warren's IRP.

My overall impression is that, due to the cooperation between these entities and their interest in doing a good job, the public is getting the most from every dollar expended. So, who is the winner in this effort? All of us in Laramie County are the beneficiaries, whether living on or off the base.

Environmental restoration is the correction of errors and oversights which took place long before anyone gave a thought to impacts on the environment. Current efforts at F. E. Warren will provide real safeguards for the future generations that will live and play in this area, and all of us who use the surface and subsurface water.

To answer my opening question: Yes, these Federally required environmental restoration efforts make me, and hopefully my neighbors in the City and county, "feel good."

F. E. Warren Supports Efforts to Save Endangered Preble's Meadow Jumping Mouse

One can hardly look at a news paper these days without seeing some item about a threatened or endangered species. Some of the information is very positive — such as the recent announcement by the U.S. Fish and Wildlife Service that the peregrine falcon is no longer considered an endangered species, and that the bald eagle is being considered for "delisting" as well. Both birds can occasionally be seen around F. E. Warren AFB. Unfortunately, some of the news about threatened and endangered species is not so encouraging. The Preble's meadow jumping mouse (Preble's), a resident of F. E. Warren, is threatened by development. However, F. E. Warren is helping the conservation efforts of this species!

The IRP is working closely with its contractors, U.S. Fish and Wildlife officials, and experts from the University of Wyoming to protect the Preble's meadow jumping mouse and its habitat during construction activities.

The Preble's is a small member of a rodent group characterized by long tails and long feet adapted for jumping. Preble's were first discovered in 1895 by the naturalist A. E. Preble, in Loveland, CO. The mouse is actually considered a subspecies of the meadow jumping mouse, and is found only in portions of Wyoming and Colorado.

Preble's bear their young in grass-lined nests. They have one litter per year, averaging five young. A Preble's will bear two or three litters in her lifetime. In late summer the mice gorge on seeds and insects in preparation for a long hibernation. The mice hibernate in underground burrows from September to May.

The secretive, primarily nocturnal mouse lives in moist lowlands and flood plains with dense vegetation, and prefers to reside near rivers or creeks. On F. E. Warren AFB, the mouse is found along the reaches of Crow Creek.

Concern over the status of Preble's led the U.S. Fish and Wildlife Service to list the mouse as threatened under the Endangered Species Act in June 1998. That action was in part in response to a petition from the Biodiversity Legal Foundation to list the mouse as endangered. As a result of the listing, survey efforts have increased and the mouse has been found in more locations than previously known. In addition, the largest populations are on the U.S. Air Force Academy and U.S. Department of Energy lands in Colorado. Other Federal lands where the mouse is currently known to exist are here at F. E. Warren and the Medicine Bow National Forest near Laramie.

The primary threats to Preble's are destruction or modification of habitat. In Colorado, where most of the currently identified mice are located, the stream areas favored by, and necessary for, the mouse are being developed at an alarming rate. This development brings indirect effects in addition to habitat alteration or destruction. Urbanization brings urban predators such as cats. Fortunately, these development pressures are not so intense in Wyoming.

Activities such as grazing management, agriculture, recreational trail development, prescribed burns, pest control activities, utility line crossings, military operations and training, and hazardous material contain-

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ment and clean up can be allowed for under the Endangered Species Act. If properly planned and managed, they should pose no threat to the mouse.

Here at F. E. Warren, we are in the process of developing a conservation and management agreement for the mouse with the U.S. Fish and Wildlife Service. Current activities at the base, using already existing controls and safeguards for the mouse, will continue and activities directed at conservation and preservation of the mouse will be increased. Examples of these activities include research into the mouse habitat characteristics on the base and the impact of predators, and DNA analysis to better understand relationships with other species. The ultimate goal of course, is to have the mouse achieve the same status as the peregrine falcon and, soon, the bald eagle — removed from the threatened and endangered species list.

Preble's, just like all species, is a part of our national heritage. F. E. Warren is proud to be able to play a role in our environmental security and in the protection, and recovery of the species.

Base Environmental Cleanup Team Spotlight: Daniel Brady

Daniel Brady is employed by Universal Technologies Inc., a contractor to the IRP, as a Scheduler/ Programmer supporting F. E. Warren's environmental restoration.

Daniel Brady, information systems contractor to the IRP.

Daniel's Background

Daniel hails from San Francisco, California, and graduated from San Francisco State University in 1977 with a Bachelor of Science degree in Engineering. He received his Master of Business Administration degree in 1979 from the University of North Carolina at Chapel Hill.

Daniel's first job was in Springfield Oregon, working for Weyerhaeuser Company first as a Quality Control Technician, then as a Plywood Foreman, and finally as a Project Engineer until 1982. He then accepted a position with John Brown E & C Inc., a prime contractor for the Department of Energy (DOE) in Casper, Wyoming. For the next ten years, Daniel remained with the company as a Systems and Procedures Supervisor and then as a Planning and Coordination Supervisor. From 1992 to 1998 he worked for Fluor Daniel Inc., another prime contractor to the DOE in Casper, as Planning and Scheduling Supervisor, Management Information Systems Manager, and Financial Manager.

Daniel Comes to F. E. Warren

Daniel was hired by Universal Technologies Inc. in July 1998 and began his work with the IRP at F. E. Warren. Since then he has maintained the base's Master Restoration Schedule, developed an intranet web site for IRP, and developed and maintained numerous databases and reporting structures to support project needs. Daniel keeps the base's information systems up-to-date, allowing easy access and making everyone else's job simpler. His contributions to the IRP in this arena during the last 15 months have vastly improved the scheduling and project tracking. Daniel is a valuable asset to the IRP!

Access Information on the Internet

Information about cleanup activities at F. E. Warren, as well as other environmental information, is available from many sources on the Internet. Visit these sites to learn about what's going on at F. E. Warren and in the community:

U.S. Environmental Protection Agency
http://www.epa.gov

Wyoming Department of Environmental Quality
http://www.deq.state.wy.us

Installation of Spill Site 7 Iron-Filings Wall Complete

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History

SS7 is located near Building 1294 (formerly Building 4000) and south of Diamond Creek. From 1960 to 1966, Building 1294 was used as a liquid oxygen production facility for Atlas missiles. TCE was used extensively as a degreaser to prevent oil and gas from reacting explosively with pure oxygen. TCE spills in Building 1294 routinely flowed to a floor drain and then to a grease trap approximately 50 yards northeast of the building. The trap consisted of a subsurface concrete structure designed to capture floating oil and grease and allow wastewater to drain to Diamond Creek. Use of the trap was discontinued in 1988, but an accidental spill flowed to the system briefly in 1989. TCE-contaminated oily sludge filled the bottom of the grease trap and overflowed onto surrounding soil. Shortly after the incident, the grease trap, sludge, and impacted soil were excavated and properly disposed at off-base disposal facilities. Since this time, TCE has been detected in the groundwater under and down-gradient of the site and in Diamond Creek in an area just down-gradient of the site.

Why Install an Iron-Filings Wall?

In October 1997, the Air Force, EPA, WDEQ, and the community agreed on the installation of an iron-filings wall because of its effectiveness in degrading contaminants to nontoxic by-products as they pass through the iron filings — a process known as "reductive dehalogenation."

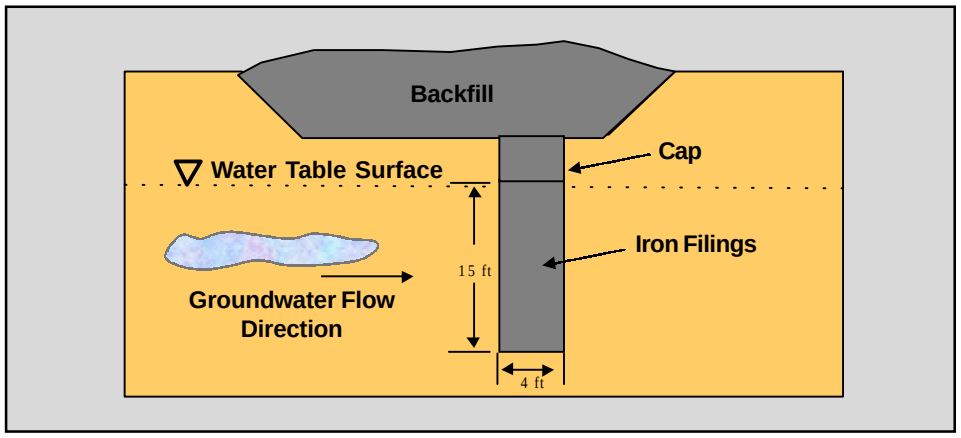

Figure 1: Cross section of the iron-filings treatment wall installed at Spill Site 7.

Benefits of using the iron-filings wall over more conventional treatment methods include:

- There are relatively minor operation and maintenance requirements associated with this technology.
- No effluent or treatment residuals are generated during operation.
- This technology is relatively cost effective.
- Using this technology can minimize long-term impacts on the site from construction activities.
- This system is consistent with possible future remedial action.

The iron-filings wall was chosen and installed to meet the following objectives:

- Minimize the potential for exposure to groundwater contaminants of concern by reducing levels within the top 15 feet of the water table to below the Maximum Contaminant Levels (MCLs) as stipulated by the Safe Drinking Water Act.
- Minimize contaminants moving to Diamond Creek from the shallow groundwater flowing under the SS7 area by reducing the groundwater contaminant levels to below MCLs within the top 15 feet of the water table.

How the Iron-Filings Wall Works

The wall has been installed vertically below ground, perpendicular to the direction of groundwater flow, as shown in Figure 1. As the groundwater flows through the permeable iron barrier, the chemical reaction resulting from the TCE contacting the iron filings will degrade the contaminants found at the site into nontoxic by-products.

The wall is 567 feet long, 4 feet wide, and extends 15 feet below the top of the water table. Approximately 30,000 cubic yards of soil was excavated at the site and 1,768 tons of iron filings were placed in the trench. Excavated soil was then used as backfill over the wall.

Construction Challenges

This project, due to its size and innovative nature, created many

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challenges for the team. The large amount of soil generated during excavation, the large size of the equipment required for this job, the sheer weight of each of the bags of iron filings, and the potential for encountering relatively high levels of contaminated soil and/or groundwater created challenging site logistics. Careful planning was required to ensure that all equipment could move around the site in a safe manner with little interference from the stockpiled soils.

Another challenge was the issue of transporting the iron filings from the manufacturing facility in Chicago, Illinois to the site in Cheyenne, Wyoming. The trucking costs for transporting over 1,768 tons of iron filings would have been extremely high. Montgomery Watson, the construction contractor for this job, arranged to have the iron filings shipped to the site via train saving approximately $35 per ton, a total of over $68,000 in savings.

In order to ensure that the iron was placed in the trench per the design specifications, a specially designed trench box was constructed specifically for this job. While initiating construction on the wall, difficulties were encountered in installing the trench box and moving it forward once it was filled with iron. Several modifications to the trench box were required, including:

- Increasing the rigidity of the box by welding the joints and adding supports in strategic locations.
- Enlarging the lifting holes on the box to allow the use of larger shackles while raising the box.
- Removing the striker-plate and re-sizing the spreader bars to allow proper placement of the iron filings and to reduce frictional drag.

Installation of a sand-iron mixture was required in some locations along the wall. Originally, a mixer was brought on-site for this task. The on-site mixer could not produce the mixture fast enough to keep up with the trenching operations. The contractor researched other mixing methods and implemented a new method mixing the iron and sand at a local batch plant off-site and trucking the finished product back to the trench. After making this modification, production increased from less than 15 feet per day to up to 60 feet per day.

Considering the innovative nature of the remedy and the size of the wall, we are satisfied with the results. Teamwork and open communication between all parties involved allowed us to overcome the difficulties that were encountered during construction of the wall and avoid cost overruns and schedule delays.

IRP Embraces Use of Innovative Technology at Spill Site 7

The iron-filings wall is an innovative technology for treating contaminated groundwater. Following are noteworthy items about the project:

- This was the first project of this size and magnitude to use a fabricated trench box method for placing iron filings in the ground. Based on its success, and armed with the lessons learned during this project, the Montgomery Watson project manager has stated that he would use this method at other sites, given the proper site conditions and wall design specifications.
- Less than one-percent change in iron usage was encountered between the original design specifications and final installation quantity. This is an extremely small variation given the size of the project.
- Significant project cost savings were recognized by using innovative approaches such as transporting the iron via train.
- Modifications and adaptations made during construction led to successful completion of the iron-filings wall with little impact to cost and schedule.

SS7 Construction Benefits Local Economy

Construction activities at Spill Site 7 provided approximately $240,000 to the local community in contractor support, local services, and food and lodging for workers.

For Additional Information...

Information about the F. E. Warren environmental cleanup program is available for review in the Administrative Record File — the official collection of documents, data, reports, and other information that supports EPA's and WDEQ's decision on cleanup at a site. You may review the Administrative Record File at the following locations:

90 SW/EM
Environmental Restoration Management
6203 15th Calvary Avenue, Building 367
F. E. Warren AFB, WY 82005

Laramie County Library
2800 Central Avenue
Cheyenne, WY 82001

For additional information about the F. E. Warren environmental restoration management program, please contact one of the following Remedial Project Managers:

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Inside: Information on F. E. Warren AFB Environmental Restoration

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